

CLAIMS

What is claimed is:

1. An apparatus for improving low vision in the eye, comprising:

5 a first optical element including an outer annular region having a first optical power and an inner region having a second optical power, said optical element sized and configured for placement on or within the eye;

10 a second optical element external to the eye and sized and configured to be in optical communication with said first optical element, said second optical element including first and second regions, said first region having a first portion having an optical power selected in conjunction with said first optical power of said outer region to provide for substantially the
15 standard distance correction required by the eye, said second region including a second portion having an optical power selected in conjunction with said inner region of said first optical element to provide a magnified focused retinal image.

20 2. The apparatus of claim 1 wherein said second optical element is a spectacle lens contained within a spectacle frame.

3. The apparatus of claim 1 wherein said inner region of said first optical element is a first lens having a negative optical
25 power and said second portion of said second region includes a second lens having a positive optical power sufficient to compensate for said negative power and creating a clear (in focus) retinal image, thus forming a Galilean telescopic system.

30 4. The apparatus of claim 3 wherein said inner region of said first optical element has a negative optical power between -30 and -100 diopters.

5. The apparatus of claim 3 wherein said second region of said second optical element has a positive optical power between +10 and +40 diopters.

5 6. The apparatus of claim 1 wherein said outer annular region of said first optical element is substantially equal to the required pseudophakic correction of the corresponding eye within which said first optical element is implanted and said second region has an optical power substantially equal to zero.

10 7. The apparatus of claim 1 wherein said outer annular region of said first optical element is in optical communication with said second region of said second optical element and wherein said optical power of said outer annular region and said optical power
15 of said second region are selected to be substantially equal to the required correction of the corresponding eye within which said first optical element is implanted.

20 8. The apparatus of claim 2 wherein said first region of said spectacle lens is a lower region of said carrier lens, and includes substantially a central region of said spectacle carrier lens and said second region of said spectacle lens is an upper region of said spectacle lens.

25 9. The apparatus of claim 8 wherein said second portion of said upper region includes a lens having a horizontally elongated configuration, wherein said horizontally elongated configuration is sized and configured to provide as wide a field of view as practical.

30 10. The apparatus of claim 2 wherein the second portion of said second region is a lens.

11. The apparatus of claim 10 wherein said lens is a single element lens.

12. The apparatus of claim 11 wherein said lens is formed
5 integral with said spectacle carrier lens.

13. The apparatus of claim 11 wherein said lens is a stick-on lens applied to the surface of said spectacle carrier lens.

10 14. The apparatus of claim 11 wherein said lens is inserted into said spectacle carrier lens.

15 15. The apparatus of claim 2 wherein said carrier lens includes an optical prescription to correct the vision of the corresponding eye.

16. The apparatus of claim 15 wherein the optical prescription to correct the vision of the corresponding eye is placed on a back surface of said carrier lens.

20 17. The apparatus of claim 15 wherein the optical prescription to correct the vision of the corresponding eye is placed on a front surface of said carrier lens.

25 18. The apparatus of claim 1 wherein the first optical element is an intraocular lens for implantation within the eye.

19. The apparatus of claim 1 wherein the first optical element is a contact lens for placement on the surface of the eye.

30 20. The apparatus of claim 1 wherein the first optical element is a pair of optical elements, one for each eye, and wherein the second optical element is a pair of second optical elements one

for each eye, wherein binocular vision is provided for in both the unmagnified wide-angle view and the magnified retinal image view.

21. The apparatus of claim 1 wherein the first optical element
5 is a pair of optical elements, one for each eye, and wherein the second optical element is a single second optical element, wherein binocular vision is provided for in the unmagnified wide-angle view and monocular vision is provided in the magnified retinal image view.

10 22. An apparatus for improving low vision in the eye, comprising:

a first optical element including an outer annular region having a first optical power and an inner region having a second
15 optical power, said optical element sized and configured for placement on or within the eye;

a second optical element external to the eye and sized and configured to be in optical communication with said first optical element, said second optical element including first, second, and
20 third regions, said first region having a portion having an optical power selected in conjunction with said outer region of said first optical element to provide for substantially the standard distance pseudophakic correction of the eye, said second region having a portion having an optical power selected in
25 conjunction with said inner region of said first optical element to provide a focused retinal image having a first magnification of a distant object, and said third region having a portion having an optical power selected in conjunction with said inner region of said first optical element to provide a clear retinal image having
30 a second magnification of an object at a short (reading) distance.

23. The apparatus of claim 22 wherein said second optical element is a spectacle lens contained within a spectacle frame.

24. The apparatus of claim 22 wherein said inner region of said first optical element is a first lens having a negative optical power and said second region of said second optical element includes a second lens having a positive optical power, each of said first and second lenses having a focal point, said first and second lenses being configured and arranged to create a clear (in focus) retinal image, thus forming a Galilean telescopic system., having said first magnification.

25. The apparatus of claim 22 wherein said inner region of said first optical element is a first lens having a negative optical power and said third region of said second optical element includes a third lens having a positive optical power, each of said first and third lenses having a focal point, said first and third lenses being configured and arranged to sufficient to compensate for said negative power and creating a clear (in focus) retinal image, , thus forming an intraocular Galilean telescope having said second magnification.

26. The apparatus of claim 24 or 25 wherein said inner region of said first optical element has a negative optical power between -30 and -100 diopters.

27. The apparatus of claim 24 or 25 wherein said second region of said second optical element has a positive optical power between +12 and +55 diopters.

28. The apparatus of claim 25 wherein said third region of said second optical element has a positive optical power between 2 and 15 diopters greater than said second region of said second optical element.

29. The apparatus of claim 22 wherein said outer annular region of said first optical element is substantially equal to the optical power required for pseudophakic correction of the corresponding eye within which said first optical element is
5 implanted.

30. The apparatus of claim 22 wherein said outer annular region of said first optical element is in optical communication with said second region of said second optical element and wherein said
10 optical power of said outer annular region and said optical power of said second region are selected to be substantially equal to the required correction of the corresponding eye within which said first optical element is implanted.

31. The apparatus of claim 23 wherein said first region of said first region is a middle region of said spectacle lens, said second region of said spectacle lens is an upper region of said spectacle lens, and said third region is a lower region of said
15 spectacle lens.

32. The apparatus of claim 31 wherein said second portion of said upper region of said spectacle lens includes a lens having a horizontally elongated configuration, wherein said horizontally elongated configuration is sized and dimensioned to provide as
20 wide a field of view as is practical.

33. The apparatus of claim 31 wherein said third portion of said lower region of said spectacle lens includes a lens having a horizontally elongated configuration, wherein said horizontally elongated configuration is sized and dimensioned to provide as
30 wide a field of view as is practical.

34. The apparatus of claim 22 wherein said portion of said second region is a lens.

5 35. The apparatus of claim 34 wherein said lens is a single element lens.

36. The apparatus of claim 35 wherein said lens is formed integral with said spectacle carrier lens.

10 37. The apparatus of claim 35 wherein said lens is a stick-on lens applied to the surface of said spectacle carrier lens.

38. The apparatus of claim 23 wherein said lens is inserted into said spectacle carrier lens.

15 39. The apparatus of claim 23 wherein said carrier lens includes an optical prescription to correct the vision of the corresponding eye.

20 40. The apparatus of claim 39 wherein the optical prescription to correct the vision of the corresponding eye is placed on a back surface of said carrier lens.

25 41. The apparatus of claim 39 wherein the optical prescription to correct the vision of the corresponding eye is placed on a front surface of said carrier lens.

42. The apparatus of claim 22 wherein the first optical element is an intraocular lens for implantation within the eye.

30 43. The apparatus of claim 22 wherein the first optical element is a contact lens for placement on the surface of the eye.

44. The apparatus of claim 22 wherein the first optical element is a pair of optical elements, one for each eye, and wherein the second optical element is a pair of second optical elements one for each eye, wherein binocular vision is provided for in both the unmagnified wide-angle view and the magnified retinal image view.

45. The apparatus of claim 22 wherein the first optical element is a pair of optical elements, one for each eye, and wherein the second optical element is a single second optical element, wherein binocular vision is provided for in the unmagnified wide-angle view and monocular vision is provided in the magnified retinal image view.

46. A kit of parts for improving low vision in the eye, comprising:

a first optical element including an outer annular region having a first optical power and an inner region having a second optical power, said optical element sized and configured for implantation in the eye;

a second optical element external to the eye sized and configured to be placed in optical communication with said first optical element, said second optical element including first and second regions, said first region having an optical power selected in conjunction with said outer region of said first optical element to provide for unmagnified and unrestricted peripheral vision, said second region having an optical power selected in conjunction with said inner region of said first optical element to provide a magnified retinal image; and

educational materials containing instructions on the application and use of said kit.